



Doing more with the same: A reality-check on the ability of local government to implement Integrated Coastal Management for climate change adaptation

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ABSTRACT

Many countries are implementing Integrated Coastal Management (ICM, also known as Integrated Coastal Zone Management or ICZM) as a means to promote the sustainable use, development and protection of coastal environments. It has also been shown that there is a policy and institutional relationship between ICM and climate change adaptation. This paper examines the relationship between ICM and climate change preparedness of local government with reference to empirical studies conducted in two developing nations, Mozambique and South Africa. Using a mixed-methods approach (content analysis of local government planning documents and semi-structured interviews with key informants), results demonstrate the level of integration of coastal management, disaster management and climate change adaptation in local development planning; and assess the state of implementation of ICM and climate change adaptation by selected local governments in the two countries. The paper makes recommendations on how to improve ICM development and implementation for coastal adaptation. The results suggest the need for closer integration between coastal management, disaster management and climate adaptation frameworks; highlight the need for enhanced support for local governments from provincial and national government; and greater clarity with regards to the coastal management mandate of local government (especially in Mozambique).

1. Introduction

Integrated Coastal Management (ICM) is widely seen as a means to promote the sustainable use, development and protection of coastal environments [1–3]. ICM is a form of adaptive management based on principles such as strategic planning, the use of participatory and deliberative processes, institutional integration and coordination, the application of science to decision-making, and human and technical capacity development. The emerging threat of climate change will aggravate existing pressures on coastal areas [4], calling for approaches capable of dealing with highly dynamic and often interacting issues [5,6]. Within this context, ICM gained wide recognition and acceptance in international policy circles as an appropriate approach to address the new challenges of adapting to climate change in the context of multiple pressures impacting coastal zones [7,8].

The links between ICM and adapting to coastal climate change have been increasingly explored in the literature. Tobey et al. [9] show that

ICM processes and best practices apply equally to managing climate change impacts, as to other coastal issues; while Falaleeva and colleagues [10] suggest that by addressing the fragmentation of governance structures and stakeholders responsibilities, ICM creates enabling conditions for adaptation, which relies on integrated planning across different scales and sectors. These authors go on to identify other elements typically promoted as part of ICM which can facilitate climate change adaptation, including integration of science in policy and stakeholder participation in decision-making. More recently, O'Mahony et al. [11] supported much of the above while also emphasizing the role of ICM in facilitating capacity building, knowledge exchange and learning to support the local implementation of national climate change policy.

One of the distinctive advantages of ICM is its ability to bridge different administrative scales (national, regional, local) and coordinate a wide range of stakeholders [12]. Adaptation, on the other hand, is an intensively local process [13]. The local implementation of ICM is therefore essential for coastal climate adaptation. Although the roles,

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responsibilities and powers of local government vary between countries, in general, local authorities manage, regulate and facilitate a wide range of coastal activities. These include land use planning, water supply, drainage, coastal protection, building and/or maintaining infrastructure, amenity provision and environmental health. All of these are relevant to both ICM and coastal adaptation. But while local government in climate change adaptation has received much attention in the literature [14–21], its role in the implementation of coastal management and ICM and how it relates to adaptation has not been sufficiently explored.

While conceptually, ICM principles may apply to addressing climate change impacts on coastal zones [7,9], this needs to be examined in practice, in relation to specific cases of local government involvement in coastal management. This is particularly pertinent in developing countries where studies show that ICM implementation has faced a number of challenges, particularly related to financial and human capacity constraints, dependency on donor support, unclear roles and power struggles [22–28]. This paper focuses on two contrasting cases of ICM in developing countries, namely Mozambique and South Africa. Both countries have been implementing ICM [29,30] but with significant differences, most fundamentally in the legal framework for coastal management [13].

South Africa started developing a specific policy for coastal zones during the early 1990s, culminating in the Environmental Management: Integrated Coastal Management Act of 2008 [31] (hereafter referred to as the ICM Act). This policy process and the resulting legislation and institutions are well described in the literature [22,30,32,33]. The Act compels coordination between all legal instruments relevant to coastal management. It also defines the institutional arrangements and management instruments for ICM [34]. These include Coastal Committees at the national, provincial and municipal levels, and national, provincial and municipal Coastal Management Programmes (CMPs). Importantly, the Act assigns specific roles and responsibilities to each sphere of government and defines time frames for preparation of CMPs by each of them [31].

Efforts to implement ICM in Mozambique also started in the 1990s. But unlike South Africa, it has not developed policies or legislation specific to ICM. The coast is managed with reference to separate legislation on environment, land, fisheries, water, forests and mineral resources. Mozambique adopted a largely project-based approach to ICM implementation often linked to donor funding [13]. It created a Department for Coastal Management within the then Ministry for the Coordination of Environmental Affairs (MICOA) and a Centre for the Sustainable Development of Coastal Zones (CDS-ZC), also under MICOA, to drive and support ICM. It also established a Technical Inter-Institutional Committee for ICM under the National Council for Sustainable Development to coordinate sector policies impacting on coastal zones. Within this context, the role of local government in coastal management is not clearly defined in the legislation, although it can be loosely extracted from the Local Government Act [35]. Despite featuring in government plans [36], a policy specifically for the coastal zone has thus far not been developed. Mozambique has recently pledged to strengthen ICM as party to the Nairobi Convention [37].

This paper examines the state of coastal management and climate change adaptation implementation by local governments in South Africa and Mozambique, and assesses the extent to which ICM is used to promote adaptation. The paper firstly provides a broad picture of the level of integration of coastal management, disaster management and climate change adaptation in development planning resorting to a content analysis of key local government planning documents. It then assesses the state of implementation of ICM and climate change adaptation by selected local governments in the two countries based on semi-structured interviews with local governments, relevant national and provincial level government institutions, NGOs, community organisations and the private sector. It concludes by making recommendations on how to improve ICM implementation for coastal adaptation.

2. Methodology

Research for this paper was conducted between 2010 and 2011. It included a content analysis of local government development planning documents in place at the time of research and semi-structured interviews with key informants from local governments and other institutions.

2.1. Content analysis

In South Africa, the content analysis focused on Integrated Development Plans (IDPs), which are 5-year planning instruments that all local governments in South Africa must prepare under the Municipal Systems Act, 2000 [38]. In Mozambique, the analysis focused on a range of plans with different time frames, including District Strategic Development Plans (4 years), Municipal Strategic Plans (10 years) and yearly activity plans.

The content analysis used a modified version of the method described by Thorpe et al. [39] (see also [40]). It consisted of selecting 10 keywords and terms related to coastal and climate issues ([Suppl. mat 1. link to keywords/terms list](#)) and examining their occurrence within the different planning documents. A total of 8 plans in South Africa and 8 in Mozambique were analysed ([Suppl. mat. 2. link to document list](#)). A count of how frequently a keyword/term (i.e. erosion, drought, etc.) was mentioned in a given document provided a simple indication of the level of interest or concern it received. The text (sentence or paragraph) where these keywords/terms occurred was copied to a spreadsheet organised by local government and document, indicating the keyword, and providing a short comment on the context surrounding its use, namely whether (1) the issue was simply mentioned; (2) it specified an action to be taken in relation to it; or (3) allocated resources to implement the action. The organisation of the data in Excel facilitated inductive analysis whereby the data were examined for patterns, themes and relationships [41].

2.2. Semi-structured interviews

Semi-structured interviews were used to explore the state of coastal management implementation and climate change responses by local governments. The interviews focused mostly on local governments, but also included relevant national and provincial level government institutions, NGOs, community organisations and private sector. A total of 22 key informants were interviewed in South Africa and a similar number in Mozambique, between April and August 2011. Interviews with local governments targeted managers or heads of department in units relevant to coastal management and climate change adaptation. Further details of the number of interviewees per type of institution are shown in the supplementary material ([Suppl. mat 3. link to interviewee details](#)).

The local governments included in the study were not selected to be geographically representative of the entire Mozambique and South Africa coastlines, both of which are extensive and encompass a large number of local government administrative units. Rather, they were selected to reflect different levels of urbanisation and exposure to climate risks. In both countries, the research focused in one region to facilitate the process of data collection: Kwazulu-Natal Province (KZN) in South Africa where there was an appropriate representation of different levels of urbanisation, from the highly urbanised city of Durban within the eThekweni Metro to the more rural uMhlathuze Municipality, facing various climate change challenges. In South Africa, metropolitan areas, and local and district municipalities are considered as local government. In southern Mozambique, the study included the capital Maputo, and three less urbanised local governments known for their exposure to floods (Xai-Xai District) and cyclones (Zavala District and Inhambane Municipality). [Fig. 1](#) shows the location of the case study local governments, while the supplementary material presents

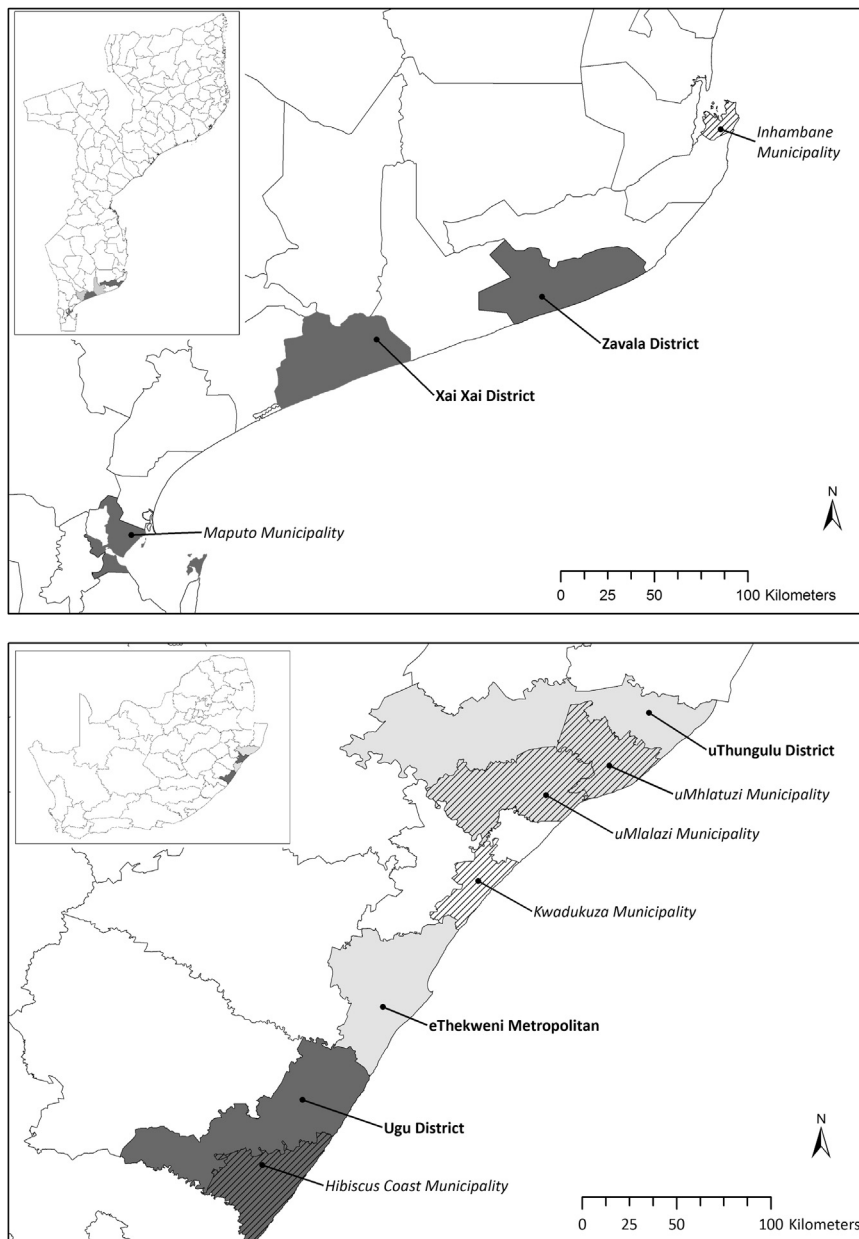


Fig. 1. Location of local governments interviewed as part of the study in Mozambique (above) and South Africa (below).

their key geographical, population and poverty statistics ([Suppl. mat. 4. link to key statistics](#)).

The drafting of interview questions was broadly informed by the ICM policy cycle [42,43] with a climate lens which looks at extent of 1) issue identification and assessment; 2) program/plan preparation; 3) formal adoption and funding; 4) implementation; and 5) evaluation [9]. The interview guide was structured into three parts. The first two parts explored coastal management and ICM implementation by local governments. Questions explored: (i) role of local government in coastal management; (ii) key local coastal issues facing local governments; (iii) organisational structure for coastal management; (iv) preparation of coastal management plans; and (v) ICM arrangements. The third part explored climate change responses, with questions aimed at exploring (i) awareness of climate change; (ii) perceived role in adaptation; (iii) steps to identify vulnerability; (iv) sources of information for planning; (v) climate change plans; (vi) climate change actions; and (vii) link between coastal management and climate change adaptation ([Suppl. mat. 5. link to interview guide](#)). This interview guide was used as a basis to develop sets of questions for other target groups, re-orienting

their focus to explore the perception of interviewees about local government.

Responses to each of the questions were summarised and inserted in a spreadsheet organised by interview question (row) and interviewee (column). Given the number of interviews, organising the data in this way allowed comparison between responses, identification of patterns, relationships and differences without the need to resort to complex coding. Data were analysed using an inductive approach to qualitative data analysis akin to that described by Bernard [41] whereby patterns were identified from the data, and explanations for those patterns put forward.

3. Results

The context analysis provided an overview of the extent to which local governments in KZN (South Africa) and Mozambique had included coastal management, disaster management and climate change adaptation in their development plans. The interviews then assessed the state of coastal management and climate change adaptation

Table 1

Number of times search terms appeared in development documents with a 3-colour scale conditional formatting applied.

Keyword	Mozambique										South Africa							
	Xai-Xai Municipality Strategic Plan 2009-2019	Xai-Xai District Strategic Development Plan 2010	Bilene District Strategic Development Plan 2010-2015	Mandlakaze District Strategic Development Plan 2008-2013	Inhambane Municipality Strategic Plan 2009-2019	Inharrime District Strategic Development Plan 2009-2019	Morrumbene District Strategic Development Plan 2011-2015	Maputo Municipality Activity Plan for 2011	eThekweni Integrated Development Plan (IDP) 2009/2010	uThungulu IDP 2012/13-2016/17	Kwadukuza IDP 2011-2016	Hibiscus Coast IDP 2012-2013	Ugu IDP 2011/2012	Umhlalazi IDP	Umhlalazi IDP 2011-2012	iLembe IDP 2011-2012		
"flood" or "inundation"	2	9	13	1	0	1	2	0	7	2	1	6	5	7	24	4		
"drought"	0	12	15	5	0	8	4	0	0	8	0	0	5	5	3	3		
"storms" or "storm surges"	0	4	0	0	0	0	0	0	1	0	0	3	0	0	9	0		
"cyclone"	0	3	9	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0
"erosion"	20	3	5	1	0	4	4	3	1	2	3	0	4	6	9	4		
"climate change"	0	1	0	0	0	0	5	3	9	17	3	0	15	0	42	10		
"disaster management" or "disaster risk management" or "risk reduction"	0	3	2	1	0	3	3	0	12	41	0	22	41	26	4	109		
"coastal management"	0	0	0	0	0	0	0	0	9	17	1	2	17	5	2	9		
"adaptation" (to climate change)	0	0	0	0	0	0	0	1	3	2	0	0	8	0	8	1		
"integrated coastal management" or "integrated coastal zone management"	0	0	0	0	0	0	0	0	1	1	2	0	4	0	0	0		

implementation by local governments, including how some of the aspects featured in development plans played out on the ground, based on the perception and experience of interviewees.

3.1. Integration of coastal management, disaster management and climate change in local planning

Table 1 shows the number of times search terms appeared in the documents reviewed with a colour formatting to facilitate trend identification, while Table 2 summarises the main findings of the content analysis of these documents. In South Africa, all Integrated Development Plans (IDPs) mentioned coastal management and included the preparation of Coastal Management Plans (CMPs). Some referred explicitly to ICM, namely in the context of CMP preparation. Disaster management featured in the majority of IDPs, and most municipalities had disaster management plans in place. Similarly, most IDPs included climate change. The extent of integration of climate change varied. Some IDPs only mentioned climate change without proposing any actions, while others stated their intention to further integrate climate

change in sector plans, develop specific climate action plans or programs, or implement existing ones (eThekweni Metro only). While adaptation was explicitly mentioned in over half of the IDPs, this tended to be in the form of general actions such as reviewing sector plans and preparing climate change strategies. Despite featuring in IDPs, coastal management, disaster management and climate change were not always allocated funds in the accompanying budgets. Funds were generally allocated to developing plans and strategies to address these issues rather than to implementation.

In Mozambique, none of the municipal and district development plans included the term coastal management or ICM. Where they featured in development plans, coastal issues and resources were generally covered under different sectors such as fisheries, forests, land and, in a few cases, under environmental management. Natural disasters and disaster management were extensively covered in all district plans, but missing from the municipal plans reviewed. Climate change featured in few of the plans examined. However, all plans mentioned various climate-related impacts/effects, and some proposed specific measures to address them. Drought, erosion, floods and cyclones were the most

Table 2

Coastal management (CM), disaster management (DM) and climate change (CC) in local development planning.

Key Terms	KZN, South Africa (n = 8)	Mozambique (n = 8)
Coastal Management (CM)	All municipalities included CM in their IDP, particularly in relation to the preparation and/or implementation of CMPs. Only 2 municipalities clearly allocated funds for CM, mostly for CM forums.	CM did not feature in any of the planning documents. Xai-Xai cites the preparation of a plan for the sustainable use of the coastal zone. All district plans mentioned natural resources management and included some measures in this area. Municipal plans mentioned environmental management.
Integrated Coastal Management (ICM)	50% (4) of municipalities referred to ICM, mostly in the context of developing CMPs.	None of the plans referred to ICM.
Disaster management (DM)	Approximately 87% (7) of IDPs included DM. All municipalities either had DM plans in place or stated their intention to prepare/review and implement them. Five out of the 8 IDPs allocated funds for DM.	Approximately 66% (5) of plans included DM (all district plans, but none of the municipal plans). Natural disasters and DM in district plans were extensively covered. The majority allocated funds for local disaster risk reduction committees.
Climate Change (CC)	75% (6) of the IDPs included CC. Extent of integration varied from simple mention through to review of sector plans in light of CC, preparation of CC plans or programs, and implementation of specific actions.	Approximately 37% (3) of plans mentioned CC. Only Maputo explicitly included measures addressing selected CC impacts. All other plans mentioned various climate-related issues such as floods, droughts, cyclones and erosion. Some included responses to these issues.
Adaptation (to climate change)	62% of IDPs (5) included adaptation in relation to CC. Adaptation measures included reviewing sector plans to include CC and formulating CC action plans. No funds explicitly allocated for adaptation with exception of preparing adaptation plans.	Only one plan (Maputo) mentioned adaptation. All plans include responses to climate-related impacts/effects, often included under disaster risk reduction. No specific funds are allocated for adaptation. Some funds allocated to addressing climate-related issues.

Table 3
Coastal management (CM) implementation by local governments in KZN (South Africa) and Mozambique.

	South Africa (KZN)	Mozambique
Coastal Management unit	Only eThekweni Metro had established a CM unit. Other municipalities had no department or unit with a formal mandate to coordinate CM. CM functions were performed by planning, environment and other departments.	None of the local governments interviewed had a CM unit. CM functions were generally performed by departments or services dealing with planning, infrastructure, environment, and economic activities.
Financial resources	eThekweni Metro allocated a significant level of funding for CM actions. Other municipalities allocated funding for the preparation of CMPs, but not for their implementation.	Only Maputo and Inhambane reported having funds for coastal related activities (i.e. building/upgrading coastal protection infrastructure) from donors. Others had no internal or external funds for CM.
Human resources	Only eThekweni had staff hired specifically to coordinate CM issues. District municipalities had staff relevant to CM such as physical planners, while most local municipalities had no such staff and relied on expertise from Districts.	None had staff specifically to deal with CM. Maputo Municipality and Xai-Xai District had environmental officers, but other local governments did not have them.
Coastal management plans	All municipalities were preparing CMPs, which are mandatory under the ICM Act.	Some had coastal management plans or strategies prepared in the context of donor-funded projects (Inhambane, Xai-Xai) but their implementation was weak. Some had general-purpose land-use plans.
ICM arrangements	There were CMP plans in place or in preparation in all municipalities. Most also had a coastal committee or coastal working group.	None had local ICM plans. Some had Community Fishing Councils (CCPs) dealing with fisheries-related issues. Multi-sectoral teams involving different government actors, NGOs and community organisations were cited as a form of ICM. These were largely dependent on external funding.

frequently mentioned. The term adaptation to climate change was largely absent from local plans with the exception of Maputo Municipality. Some featured measures that could be considered adaptation under natural disaster risk reduction, including, for example, promoting drought tolerant crops, conservation agriculture, and building dwellings in areas less prone to floods and more resistant to strong winds and heavy rains. These, however, were not referred to as adaptation. None of the plans reviewed allocated funds labelled as ‘climate change’ or ‘coastal management’. In some, budget items could be loosely traced to these issues, for example, soil conservation techniques or coastal protection infrastructure. Districts included funds for disaster management, mostly for disaster risk reduction committees.

3.2. State of coastal management implementation

Table 3 summaries the main results of the key informant interviews regarding the state of coastal management implementation by local governments in KZN (South Africa) and Mozambique.

In South Africa, coastal management was readily recognised by municipal managers and officers as one of the responsibilities of local government. The extent to which local government interviewees were able to provide an elaborated description of these responsibilities varied. Some simply referred to local government as being responsible for coordinating coastal management, while others emphasised development planning and regulation roles, and cited coastal management legislation (the ICM Act) and ICM institutional arrangements (Coastal Working Groups). In Mozambique, local government interviewees also recognised coastal management as forming part of local government responsibilities. The role of local government in coastal management was generally described in relation to addressing specific coastal-related problems experienced locally including erosion, unregulated development, unsustainable resource use, and habitat degradation. Some non-local government interviewees cited the Local Government Law [35] as key to defining the role of local government in coastal management, but none of the local government interviewees did so.

The way local governments organised internally to implement coastal management varied within and between the two countries. Units or departments in the local government organisational structure dedicated specifically to coastal management were rare and existed only in eThekweni Metro, South Africa. Elsewhere in that country, coastal management functions were performed by planning departments and, in one case (Ugu District), by the department responsible for the environment. In Mozambique, coastal management was largely regarded as a sub-set of environmental management. In Maputo and

Inhambane municipalities, the responsibility for coastal management was located in departments dealing with environment, which also dealt with other issues such as planning (Maputo) and urbanisation and water (Inhambane). In districts, coastal management responsibilities were shared between units dealing with planning and infrastructure, and with economic activities. Most districts did not have units dealing specifically with environment.

In South Africa, all municipalities reported allocating funds to coastal management from their own budgets. The perceived level of funding allocated varied between municipalities. eThekweni Metro reported a 1.5 million rand budget allocation for coastal management, which was considered significant in the South African context. In other municipalities, budget allocations for coastal management were limited to preparing CMPs, with no associated funding for their implementation. In Mozambique, some municipalities (Maputo and Inhambane) had funding for specific coastal management actions, mainly coastal protection/rehabilitation, from donor-funded projects rather than their own budget. Districts reported having no funding for coastal management.

Lack of human resources for coastal management (both in terms of numbers and appropriate skills) was cited as a key problem affecting the ability of local governments to address coastal issues. This was common in both countries, but more serious in Mozambique, particularly in the districts. Only eThekweni in South Africa had hired staff specifically to coordinate coastal management. However, even in this case there was only one staff with a specific coastal management job description. Compared to the other South African municipalities, eThekweni Metro was considered well-resourced in terms of technical expertise for coastal management (planners, engineers and environmental officers). Local municipalities often had none of these professionals and relied on district municipalities for expertise needed for planning and other coastal management functions. In Mozambique, municipalities were perceived as being better capacitated in terms of human resources than districts. The latter often struggled to hire technical staff due to their rural location, which is less attractive to professionals than the urban settings of municipalities. Neither municipalities nor districts had staff specifically to deal with coastal management. Some municipalities had environmental officers, but districts generally did not.

Municipalities in South Africa had institutions for ICM, which included a coastal committee in the case of eThekweni, and coastal working groups in the other municipalities. In Mozambique, there were no ICM institutional arrangements at the local level. Multi-sectoral teams formed to address specific issues were cited as a form of ICM, but

Table 4
Climate change adaptation by local governments (LGs) in South Africa and Mozambique.

	South Africa (KZN)	Mozambique
1. Issue identification and assessment		
<i>Steps to identify impacts/vulnerability</i>	Only eThekweni Metro had conducted climate impact assessments, including sea-level rise.	Only Maputo Municipality had conducted a climate impact assessment. Other LGs had identified areas affected/prone to flooding and erosion.
2. Program preparation		
<i>Climate change plan or strategy</i>	eThekweni Metro had a Climate Protection Program, which included an overall CC adaptation strategy, sector-based adaptation plans and inclusion of CC in the IDP. Kwadukuza Municipality had a CC response strategy. Other municipalities had no strategies or plans but intended to incorporate CC in their IDPs.	Maputo was preparing a CC adaptation strategy. None of the other LGs had adaptation strategies or plans.
<i>Climate change actions</i>	eThekweni Metro had several projects under the Municipal Climate Adaptation Program. There were few or no projects in other municipalities, but most intended to develop such projects with integration of CC in IDPs.	All LGs reported actions perceived as climate adaptation. These actions focused on coastal protection and resettlement away from flood prone areas (municipalities) and on water, agriculture, and awareness-raising (districts).
3. Adoption and funding		
<i>Funding for climate change</i>	eThekweni Metro had mobilised funding for CC actions from its own budget but few were under the heading of CC. It also mobilised funding from donors. Kwadukuza Municipality had mobilised 'seed' CC funding from its own budget. Other municipalities were considering mobilising funds for CC through the IDPs.	Funding for CC came mainly from international donors. None of the LGs had allocated funds specifically for CC.
4. Implementation		
<i>Leading department for climate change</i>	Only eThekweni had a formally designated department to drive, coordinate and implement CC responses (Environmental Planning and Climate Protection)	Only Maputo had a department formally responsible for taking the lead on CC issues (Department of Environmental Management)
<i>Link between coastal management and climate change adaptation</i>	Most municipalities had or intended to incorporate climate CC in their CMPs. However, adaptation plans were standalone and not embedded in CMPs. CC featured on the agenda of coastal committees and working groups.	None of the LGs had institutions or planning instruments to link coastal management and CC issues.
5. Evaluation^a		
Constraints / barriers	<ol style="list-style-type: none"> 1. Awareness and understanding of CC at political level 2. Funding 3. Knowledge and information of CC and response options 3. Expertise, technical skills, capacity 4. Leaders, champions at technical and political level 4. Human resources (staff) 4. Supportive policy and institutional environment 	<ol style="list-style-type: none"> 1. Funding 2. Expertise, technical skills, capacity 3. Knowledge and information of CC and response options 4. Human resources (staff) 5. Awareness and understanding of climate change at political level 5. Autonomy from national government 6. Coordination mechanisms 6. Awareness and understanding of CC by the population

^a Numbers indicate ranking according to the number of interviewees citing a given constraint/barrier. Some respondents cited more than one constraint/barrier.

these were often established in the context of externally-funded activities (national government agencies, through donors funds) and did not appear to operate beyond the end of such activities.

3.3. Climate change adaptation by local coastal government

Table 4 summarises the status of climate change adaptation by local governments in South Africa and Mozambique, drawing on the results of the semi-structured interviews conducted in both countries mainly with key informants from local government, but also from provincial and national government, NGOs and community organisations. Results are organised following the coastal management policy cycle applied to climate change [42,43].

3.3.1. Issue identification and assessment

There was general recognition amongst interviewees in both countries that climate change has become part of the concerns of local governments, prompted by the devastating effects of extreme weather events in recent decades. In South Africa, the 2007 storms were widely cited as a turning point event contributing to raise awareness of the impacts and, importantly, the costs of climate change due to significant damage to property and infrastructure. In Mozambique, interviewees cited a wide range of climate impacts and effects experienced, including floods, droughts, irregular rainfall, cyclones and coastal erosion. They highlighted the loss of human lives caused by extreme flooding and the negative impacts on livelihoods given the reliance of a large proportion of the Mozambican population on rain fed agriculture, and on coastal settlements and infrastructure such as roads and bridges which are

crucial to move people and goods, including food, across the country.

Despite wide recognition and concern with climate change, assessments of climate impacts to inform planning at the local government scale had only been conducted in eThekweni Metro (South Africa) and Maputo Municipality (Mozambique). Elsewhere, some local governments had identified areas already affected by climate impacts, including areas prone to flooding and showing signs of erosion. However, they had not completed comprehensive assessments taking into consideration how future impacts of climate change would affect the various sectors (for example water, agriculture, the coastal and marine environment, human settlements and well-being).

Both countries had national or provincial-level assessments of climate impacts and/or vulnerability, but awareness of these amongst local government interviewees was limited. In South Africa, a Coastal Vulnerability Index for KwaZulu-Natal Province [44] was cited by one municipality interviewee as a source of information for planning climate responses. In Mozambique, the climate vulnerability and impact assessment undertaken by the National Institute for Disaster Management was mentioned only by one local government interviewee. Other interviewees cited local vulnerability assessments conducted by government agencies and NGOs based on participatory methodologies such as the Community-Based Risk Screening Tool [45]. However, these were rare and tended to cover only single sites rather than entire districts or municipalities.

3.3.2. Program preparation

In South Africa, eThekweni Metro was generally more advanced in strategic planning for climate change, informed by previous studies to

identify impacts. It had initiated a Municipal Climate Protection Programme in 2004, which led to the development of a Headline Climate Change Adaptation Strategy and sector-specific municipal adaptation plans for three priority sectors, namely health, water and disaster management. Elsewhere, Kwadukuza Municipality had commissioned a climate change response strategy to external consultants. Some municipalities appeared to opt for mainstreaming climate change into the work programs of different sectors and in IDPs rather than preparing overall or sector-specific adaptation plans. In uThungulu Municipality, for example, interviewees suggested that the most effective way to address climate change was to promote a subtle shift towards climate change in what different sectors were already doing, while in uMhlathuze Municipality, the climate change strategy was fully integrated into the IDP. There were also municipalities where climate change prompted no responses despite being recognised as a pressing issue at the technical level. In these municipalities, technical departments were still making efforts to bring climate change issues onto the attention of politicians and municipal political agendas.

In Mozambique, none of the local governments interviewed had a specific climate change strategy or plan in place, but all cited several adaptation actions they were promoting. Maputo Municipality had two major climate change projects, funded under UN Habitat's Cities and Climate Change Initiative and by the Arab Bank for Economic Development in Africa (BADEA). The former supported an assessment of the impacts of climate change in Maputo City as a basis for future adaptation actions, as well as zoning and protection of mangrove areas and capacity building for municipal government staff. The latter funded the rehabilitation and upgrade of Maputo's coastal defence infrastructure. All other local governments interviewed reported various actions to address climate change, including, for example, raising the awareness of local communities about the need to use resources sustainably (particularly with regards to preventing forest fires); building rainwater harvesting systems; promoting soil conservation techniques; protecting coastal dunes and forests; planting trees; restoring mangroves; and resettling families away from flood prone areas. These, however, were generally not based on an assessment of current and future climate impacts or part of wider adaptation strategies.

In South Africa, the main link between climate change adaptation and ICM was through CMPs and coastal committees and working groups. Some of the IDPs reviewed in the content analysis referred to the revision of all major planning instruments including CMPs to include climate change. In interviews, CMPs emerged as a way to identify climate issues and responses specific to the coastal zone. Coastal working groups were cited as an important venue to discuss climate change issues and possible solutions. However, the main drivers of climate change responses in municipalities were not the CMPs, but specific climate change strategies/plans. In Mozambique, there was a lack of formalised ICM arrangements at the local level. Interviewees pointed out the role of multi-sectoral teams formed by technical staff from various local government departments and other stakeholders to address specific coastal issues, and suggested that these could also be mobilised to identify and address climate change issues. However, this mechanism was largely dependent on external funding and did not provide a regular platform for issue identification and response planning.

3.3.3. Adoption and funding

In South Africa, some local governments started to allocate funding for climate change-related activities, but most interviewees considered the current funding provisions inadequate. One interviewee described climate change funding as a 'little blip in the radar', while several pointed out that climate change loses to competing priorities, particularly those related to service provision such as water, sanitation, waste management and electricity. However, some steps were being given to include climate change in IDPs, which is expected to slowly mobilise more funds for adaptation. Interviewees also highlighted that,

even when adaptation activities are funded, these do not appear in budgets as 'climate adaptation'. Rather, funds are allocated to sectors and specific actions that are adjusted to contribute to climate change adaptation. Some interviewees suggested that climate change is not necessarily something new, and is largely about ensuring that municipal departments work more efficiently by considering the overlaying impacts of climate change.

In Mozambique, actions taken specifically in response to climate change were funded mainly by international donors and funding agencies. This was the case of the climate change projects implemented in Maputo Municipality. The various actions implemented by districts perceived as contributing to adaptation were funded from their own budgets (i.e. rainwater harvesting systems) or promoted as part of national programs (i.e. awareness raising, tree plantation). In some local governments, interviewees suggested that funds for adaptation should come from international donors and NGOs. Others, however, emphasised the need for local governments to mobilise internal funds, and highlighted the importance of including adaptation actions in their budgets. However, it was also argued that local governments need to vastly improve their ability to collect taxes and fees in order to be able to invest in adaptation and other activities that promote the well-being of their communities. Local governments, particularly districts which have a lower level of economic activity than municipalities and consequently a lower revenue base, are highly dependent on transfers from central government. This limits their ability to allocate funding beyond what is required to address their basic statutory functions.

3.3.4. Implementation

In South Africa, only eThekweni Metro had a department set up specifically to develop, implement and coordinate climate change actions, the Environmental Planning and Climate Protection Department, which contains a Climate Protection Branch to oversee the implementation of the Municipal Climate Protection Programme in articulation with relevant sector departments. uMhlathuze Municipality planned to appoint a climate change champion to coordinate and ensure the implementation of climate-related actions, and to establish a climate change working group to discuss climate impacts and solutions with a range of stakeholders. In other municipalities where climate change is given some prominence such as uThungulu, there was no single department responsible for climate change implementation. Interviewees in uThungulu District emphasised the cross-cutting nature of climate change and the need to involve all departments. In Mozambique, only Maputo had formally designated a specific department, the Department of Environmental Management, to coordinate climate actions. Elsewhere, such actions were implemented by relevant line departments or services depending on the issue being addressed. Some interviewees mentioned local disaster management committees (district and village level) in the context of measures to address climate change.

3.3.5. Evaluation

Evaluation focused on the main constraints faced by local governments in better preparing for, and responding to, climate change. These are summarised in Table 3. The constraints identified by interviewees were coded and the frequency they were mentioned counted and then ranked to provide a broad perspective of their perceived importance. The most frequently cited constraint in South Africa was poor awareness and understanding of climate change issues by politicians which, according to interviewees, resulted in such issues being accorded relatively low priority in planning and budget allocations. The second most cited constraint was inadequate funding for adaptation, which was related to how climate change was understood and prioritised in light of what were generally seen as competing demands for service delivery. This was followed by lack of knowledge and information about the impacts of climate change and appropriate adaptation measures; and lack of skills and expertise to understand climate change impacts and

vulnerability, and to plan and implement responses. In South Africa, interviewees also pointed out the importance of leadership, both at political and technical levels, to drive a climate change agenda in municipalities, and often talked about the need for climate change champions in local government. Other challenges identified were insufficient human resources and the need for a more supportive policy and institutional environment at the national scale to enable local government action on climate issues.

In Mozambique, most of the constraints identified were similar. Lack of funding was the most widely mentioned, although some interviewees suggested that internal funding could be mobilised if climate change issues were given more prominence in the local political agenda. Insufficient technical skills and capacity for adaptation planning was the second most cited constraint, followed by knowledge and information gaps about climate impacts and adaptation options. Understaffing (human resources) in face of heavy workloads was also mentioned as a constraint, followed by the problem of limited awareness and understanding of climate change issues by local politicians who make the decisions. Interviewees in Mozambique mentioned other constraints that did not emerge in South Africa. These included the dependency and lack of autonomy of district governments in relation to national government, which limited their ability to make and implement decisions to respond to climate threats timely and efficiently; and poor coordination between various actors and lack of mechanisms to avoid fragmentation of adaptation efforts. Finally, poor awareness and understanding of climate change amongst the local population impacting on the their acceptance of certain measures such as building restrictions on high risk areas and relocation to safer areas was also seen as a constraint facing local government efforts to address climate change.

4. Discussion

The content analysis showed that ‘coastal management’ is largely unrecognised in Mozambique’s local development plans, while in South Africa it features extensively in such plans. This reflects the different stages of development of coastal management policy and legislation in the two countries, particularly in what concerns defining the roles and responsibilities of different levels of government. The need to address unclear mandates, roles and responsibilities is highlighted in the literature as being crucial to create an enabling institutional environment for both coastal management [12,46,47] and climate change adaptation at local scale [18,48,49]. In South Africa, the ICM policy and legal framework clearly defines the roles of local, provincial and national spheres of government in coastal management, and requires municipalities to develop local coastal management plans aligned with provincial and national plans [30,33,34,50]. By compelling municipalities to identify and prioritise coastal issues and risks, and include them in local development planning, this framework can enable more strategic responses to coastal risks, including those related to climate change. In contrast, the lack of such framework and a clear coastal management mandate for local governments in Mozambique encourages a piecemeal approach to local government engagement in addressing issues impacting on coastal zones [13].

The integration of disaster management in local government development planning was more common and comprehensive in South Africa. Similarly to coastal management, the integration of disaster management in local development plans appears to be facilitated by the policy and legal framework. In South Africa, the 2002 Disaster Management Act [51], among other measures, compels municipalities to prepare a disaster management plan and make it an integral part of their IDPs (Article 53, 1/a and 2/a). In Mozambique, only district plans covered disaster management, with the main related measures being support for local disaster risk management committees. This is likely to change following the 2014 Law for Disaster Management [52] and subsequent 2016 regulations [53] which provide clarity on the role of

the different levels of government in disaster prevention, mitigation and recovery, and sets out the obligations of local government in this respect. In both countries, many of the disaster risks highlighted in local development plans were climatic and affected coastal zones, but the linkages between disaster management, coastal management and adaptation were rarely made. This echoes the findings of Roberts [54] who noted that municipal disaster management responses in South Africa have not focused sufficiently on enhancing coping and adapting capacities to reduce vulnerability to disasters. Similar arguments regarding the need to promote adaptation as part of disaster management strategies are made by several authors [55–59].

The content analysis found mixed evidence of inclusion of climate change in local development plans in South Africa, while in Mozambique adaptation was absent from most plans. South Africa’s municipalities are making some progress in developing climate action and response plans and/or strategies. However, few allocated funds for their implementation, and the extent to which municipalities intended or were willing to commit own funding was unclear. A similar pattern was found elsewhere [60,61], and it may be that local governments see such plans as a means to leverage funding from other sources. In both countries, it was generally the larger and more economically developed municipalities that were including climate change in local development planning and allocating some funding for implementation. Currently, there are no statutory requirements in either of the two countries for local governments to undertake climate change impact assessment and adaptation planning. This means that we are likely to see more progress in larger cities which have more resources to undertake adaptation planning – a trend that has been reported elsewhere [18,62], and prompted some authors to recommend the development of a regulatory framework specifying statutory duties for the different levels of government for climate change risk management and adaptation planning [18,63,64]. Other authors note the importance of less prescriptive approaches, including guidelines and standards to empower local government in risk identification, prioritisation and scoping of adaptation options [65,66].

The content analysis also suggests that the institutional environment for coastal management in South Africa appears, at first glance, to enable local government action in relation to issues affecting the coastal zone, including climate change. However, on the ground there is much variance in how, and to what extent, municipalities are implementing the provisions contained in the coastal management policy and legislation. The main challenges are related to financial and human capacity constraints. Thus, while all municipalities had or intended to develop CMPs, generally prepared by consultants and to comply with the ICM legislation, their implementation was constrained by lack of funding, staff and expertise. Other studies in South Africa have reached similar conclusions [22,50,67], which suggests that unless implementation challenges are addressed, ICM is unlikely to provide a viable platform for local government to respond to climate change.

In Mozambique, it was generally recognised that local governments play an important role in coastal management. Some of the recurrent problems that affect coastal management efforts in many developing countries were also found in Mozambique, including lack of funding; personnel; relevant skills; and sustainable mechanisms for collaboration and coordination of coastal issues across different sectors and stakeholders [68]. Moreover, the coastal management initiatives and plans reported by local government were largely developed in the context of donor-funded programs and some did not continue beyond them. Although the reasons for the lack of sustainability of ICM efforts in Mozambique are beyond the analytical scope of this paper, research shows that some of the most important factors influencing the sustainability of externally-funded local coastal management initiatives are institutional and include, for example, the extent to which project activities are incorporated in the normal functions of local government; building local ownership through involvement of local government and other stakeholders in project design, implementation and evaluation; and the

existence of an adequate policy and legal framework that devolves coastal management functions and responsibilities to local government units [27,28,69–71].

Similarly to coastal management, the status of local government action for climate change adaptation was uneven within and between the two countries. In both countries, the large cities (eThekweni Metro and Maputo Municipality) had undertaken reviews of the projected impacts of climate change in order to inform adaptation planning. Greater progress in planning, funding allocation and implementation was seen in eThekweni which is widely recognised as an early adopter of adaptation practice internationally [72–77], and serves as a model for other South African municipalities to follow [78]. Other KZN municipalities had not undertaken impact or vulnerability assessments, but some were nevertheless in the process of developing adaptation plans. The extent to which such plans will be translated into action is uncertain given the wide range of barriers identified in this study, which largely correspond to those found across a number of other studies in South Africa [54,63,79–82] and beyond [83–85]. Currently, ICM enjoys statutory support which climate change does not have, and could potentially be the building block of a coordinated framework for coastal management and climate adaptation. However, planning for climate change and ICM appears to be disconnected, with the preparation of separate adaptation and coastal management plans. These need to be more closely linked in order to create such a framework [10].

In Mozambique, most local governments did not explicitly address climate change in their strategic planning documents. However, the interviews found that in practice they recognise and are concerned with a number of climate-related effects, particularly floods, droughts and erosion, and are taking some actions in response. These are often emerging in the context of disaster risk reduction, and in the absence of formal climate impact and vulnerability assessment and specific climate adaptation plans (with the exception of Maputo). Moreover, the literature provides evidence that many adaptations, particularly in rural areas, are being undertaken spontaneously by individuals and households, independently of government support, through informal networks [86]. Local governments are therefore starting to respond to climate change, but in a largely uncoordinated manner, without effectively considering future impacts and continuous spontaneous adaptation, and more often under the banner of disaster risk reduction rather than climate change adaptation. Recent literature has highlighted the different approaches local governments are adopting to respond to climate change, ranging from addressing current hazards, through to mainstreaming and preparing specific plans [62,63,79,83]. Regardless of the specific approach or combination of approaches, these studies often highlight the need for coordination of responses, which is an important weakness in Mozambique. The preparation of municipal/district adaptation plans can be an option to promote a more co-ordinated approach, but the experience in Mozambique of preparing such plans suggests they are often project based and lack sustained support for implementation [87]. Finally, although ICM is largely underdeveloped at the local scale, Mozambique has a relatively well-developed disaster preparedness framework operational and the local level, which could be harnessed for the strategic planning and co-ordination of coastal adaptation.

5. Conclusion

ICM promises a holistic and integrated approach to management of the coast which has potential for addressing coastal climate risks and promote adaptation. However, its development and implementation has faced a number of challenges in both South Africa and Mozambique. In South Africa, substantial progress was made in developing the ICM policy and legal framework, but many local and district municipalities, faced with limited resources and competing demands, are struggling to implement it effectively and within the timeframes established. Beyond ICM, there is also a well-developed disaster

management framework and some municipalities are starting to prepare adaptation plans. Yet these three frameworks (ICM, disaster management and climate change) are poorly articulated, and local government capacity and resources affects the effective implementation of all three. It is no wonder that municipalities feel overwhelmed when trying to meet the requirements placed on them by various frameworks and targets. Efforts need to be made to strengthen the relationships between these and provide the resources and support necessary for implementation. While there is a strong argument for mainstreaming climate change within existing development plans and budgets, it is unrealistic to expect that local governments continue to do more with the same resources, particularly in the context of limited technical capacity, increasing service provision demands from a growing population, escalating climate risks, and partial knowledge of how such risks will affect them in the future. In the first instance, provincial and national government needs to be more proactive in supporting municipalities, not only in terms of funding but also facilitation of integrated planning processes to address cross-cutting issues.

In Mozambique, there is an obvious need to further develop the ICM policy and legal framework, particularly in terms of assigning clear roles and responsibilities to different levels of government for coastal management, which would give a more defined mandate to local government. Disaster management and, to a certain extent climate change, are better established in local government than coastal management. Strengthening and improving the effectiveness of local government engagement in coastal management and climate adaptation requires addressing common barriers such as insufficient funding, human resources, skills, knowledge, and political and community level understanding and recognition of climate issues. However, there is also an opportunity to identify climate risks, plan and implement responses through enhancing existing disaster management institutions. This may be more effective and have fewer costs than establishing new institutions specifically for climate change adaptation.

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Appendix A. Supporting information

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